

# **Potential Circulation Patterns Around Puerto Rico and their Influence on Larval Dispersal**

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# Long Distance Connectivity

- Larval behavior
- Nearshore current flow
- Offshore meso-scale processes

# Recruitment Patterns

- Is the system self-seeding, and if so which physical or biological factors are determinant?
- Is the exchange of larvae between areas sufficient to ensure gene flow and maintain healthy populations?



# General Objectives

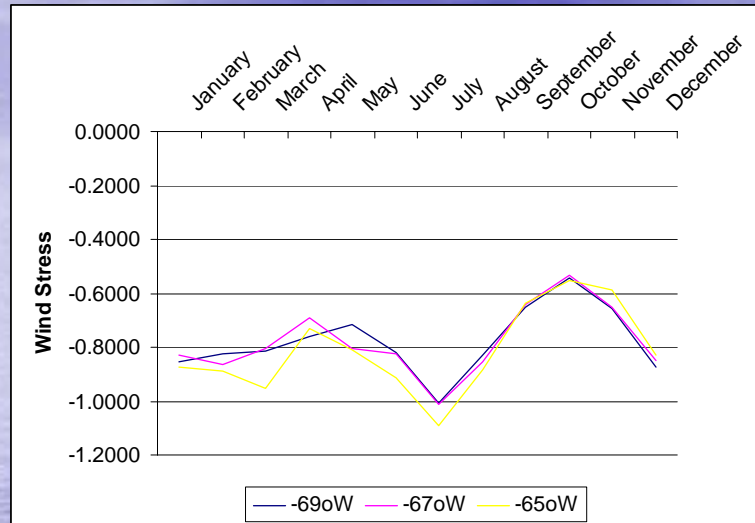
- To implement the Regional Ocean Model System (ROMS). A free-surface, hydrostatic, primitive equation ocean model that uses stretched, terrain-following coordinates in the vertical and orthogonal curvilinear coordinates in the horizontal.
- Develop a Lagrangian numerical model for particles transport using the flow field output of the general circulation model.

# Model Development: The Past

- Regional Ocean Model System (ROMS) implementation.
  - Three-dimensional
  - Primitive equation
  - Song and Haidvogel (1994)
  - Monthly (30 days) runs with a time step of 120 seconds.
- Forcing and Boundary Conditions.
  - Uses Levitus dataset for salinity and Temperature.
  - Uses Hellerman dataset for wind stress.
  - No-slip open boundaries with Orlanski Radiation.

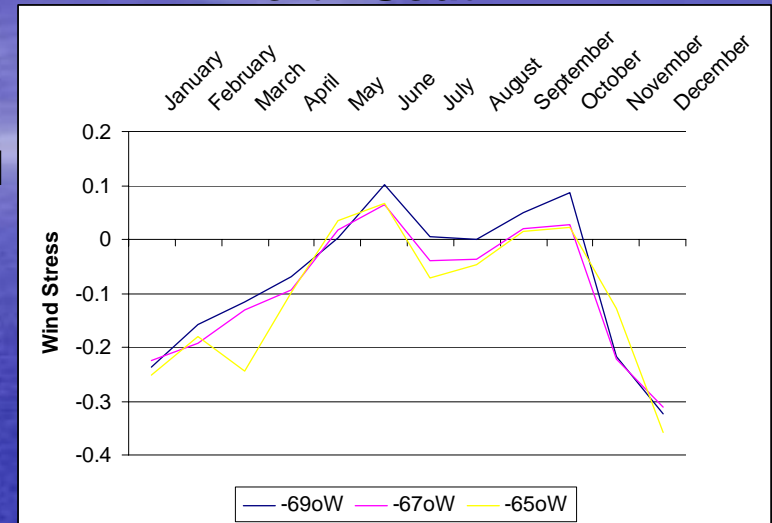
# Monthly wind stress values in the east-west and north-south directions input into the model

## East-West

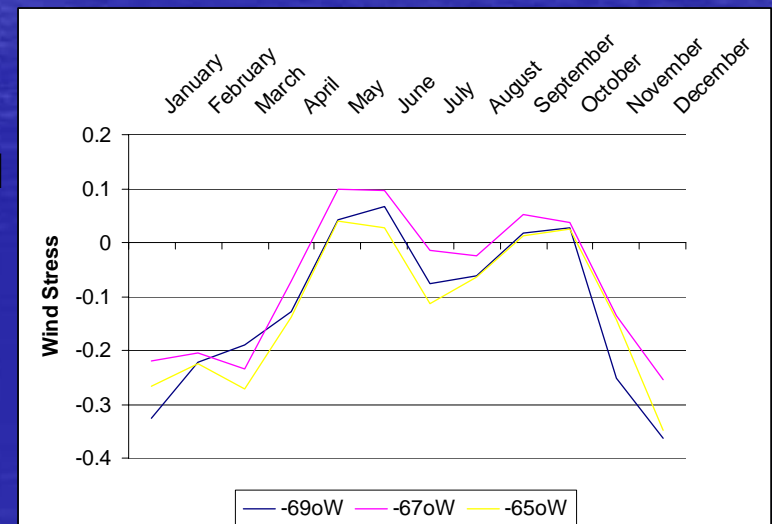
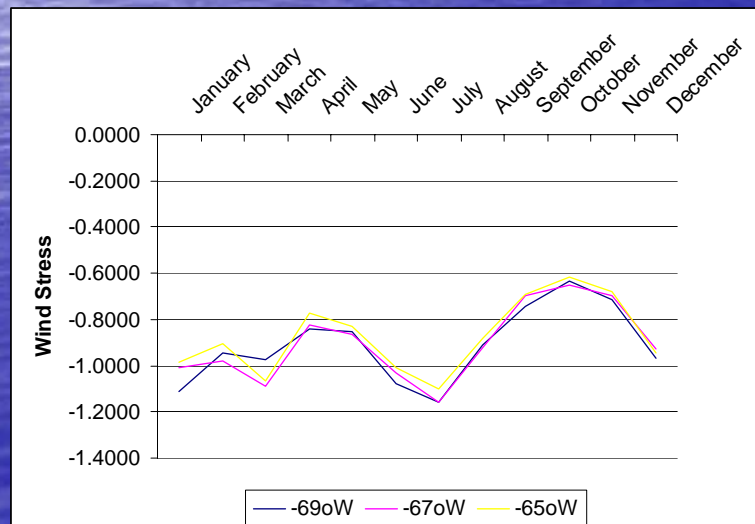


19.0°N

## North-South



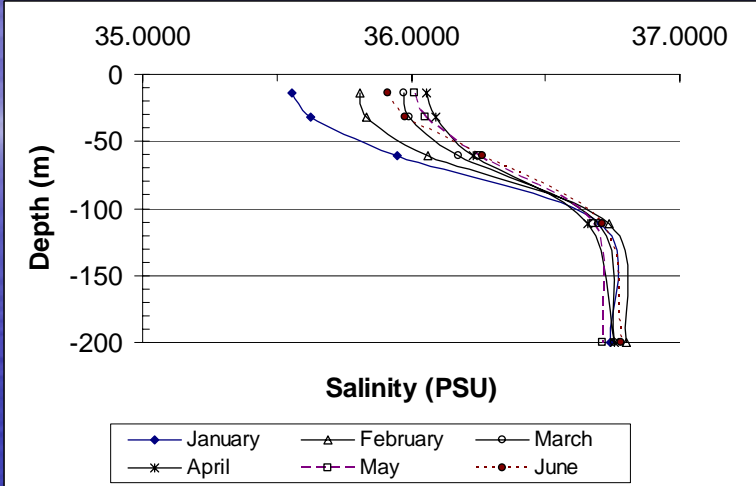
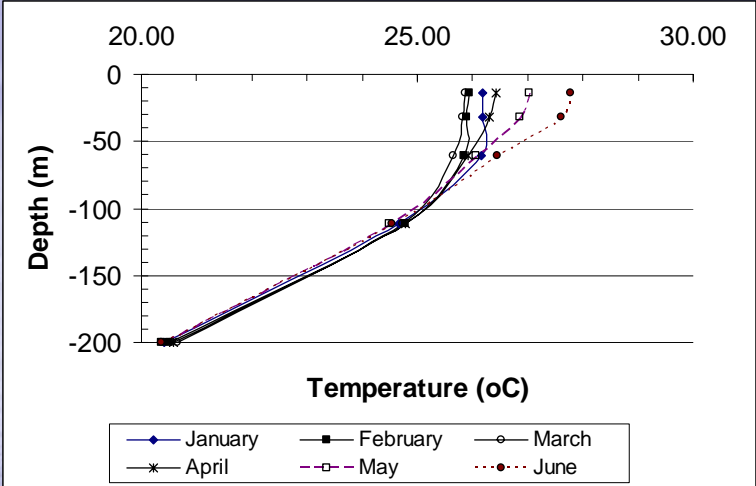
17.0°N



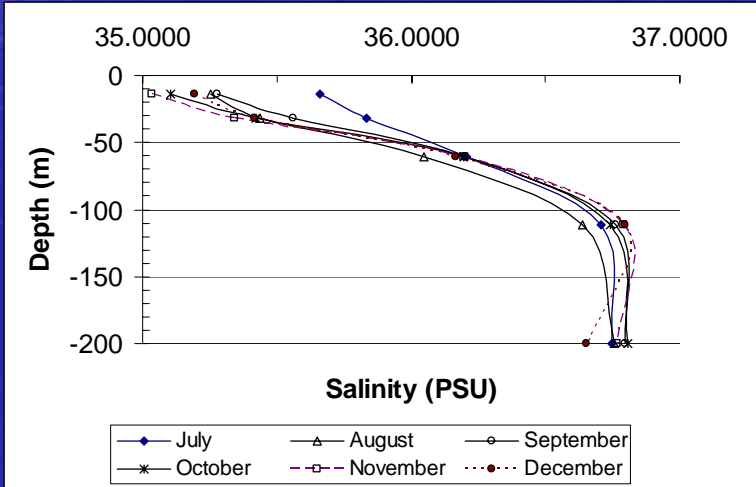
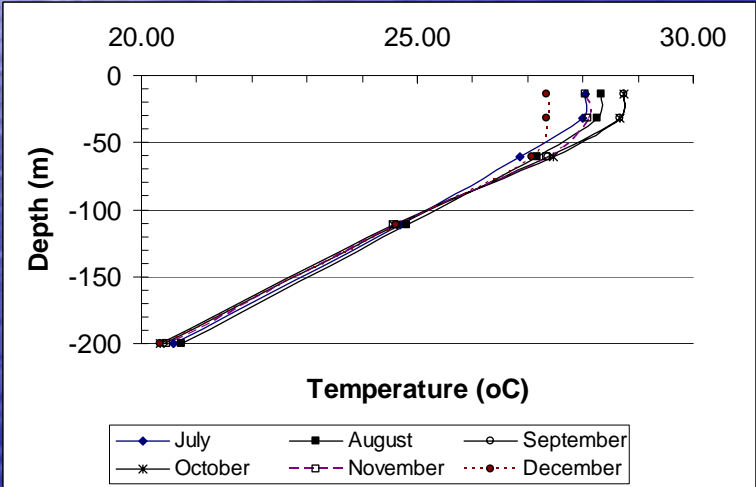


# Monthly temperature and salinity values input into the model

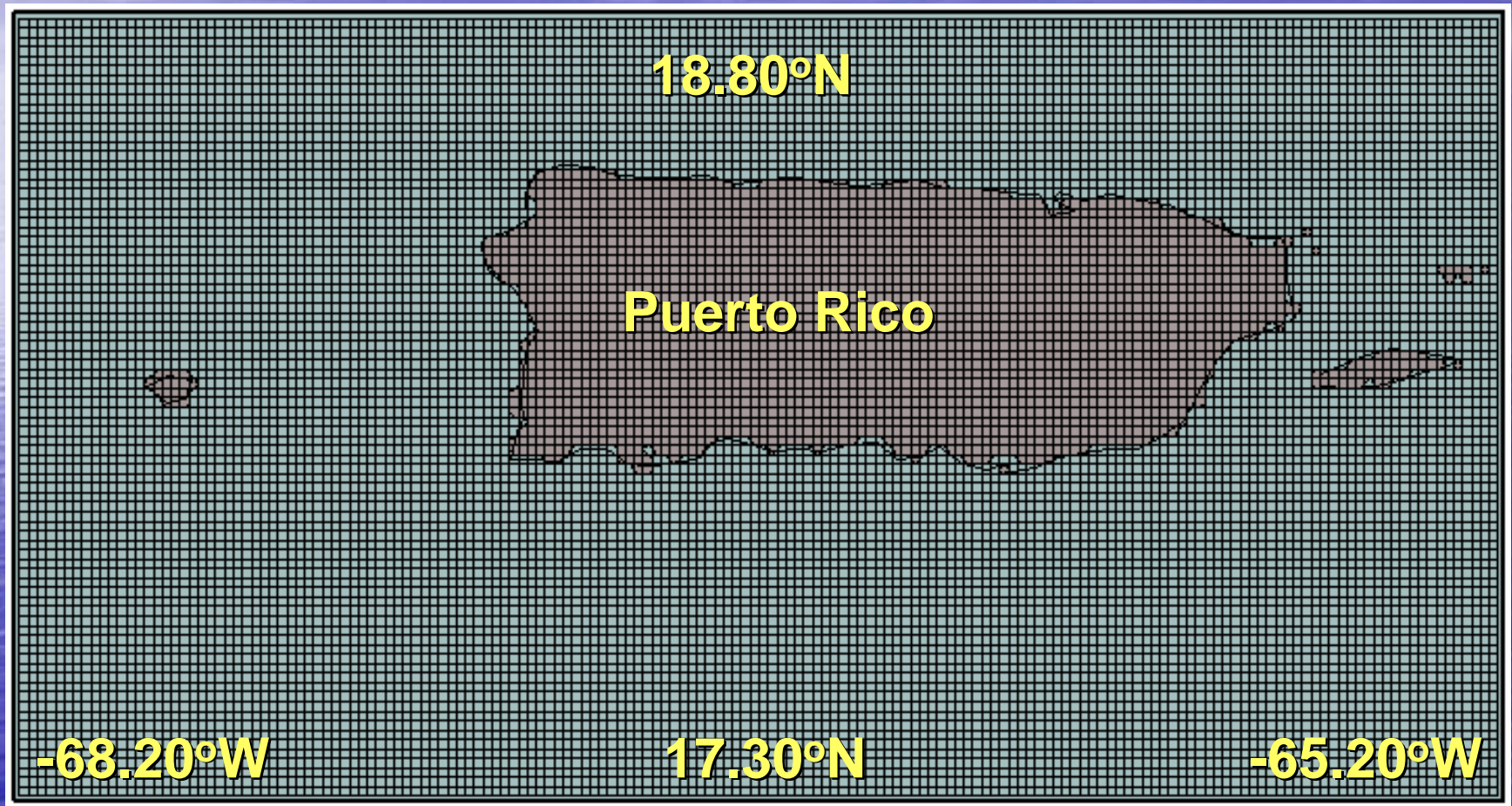
19.0°N



17.0°N

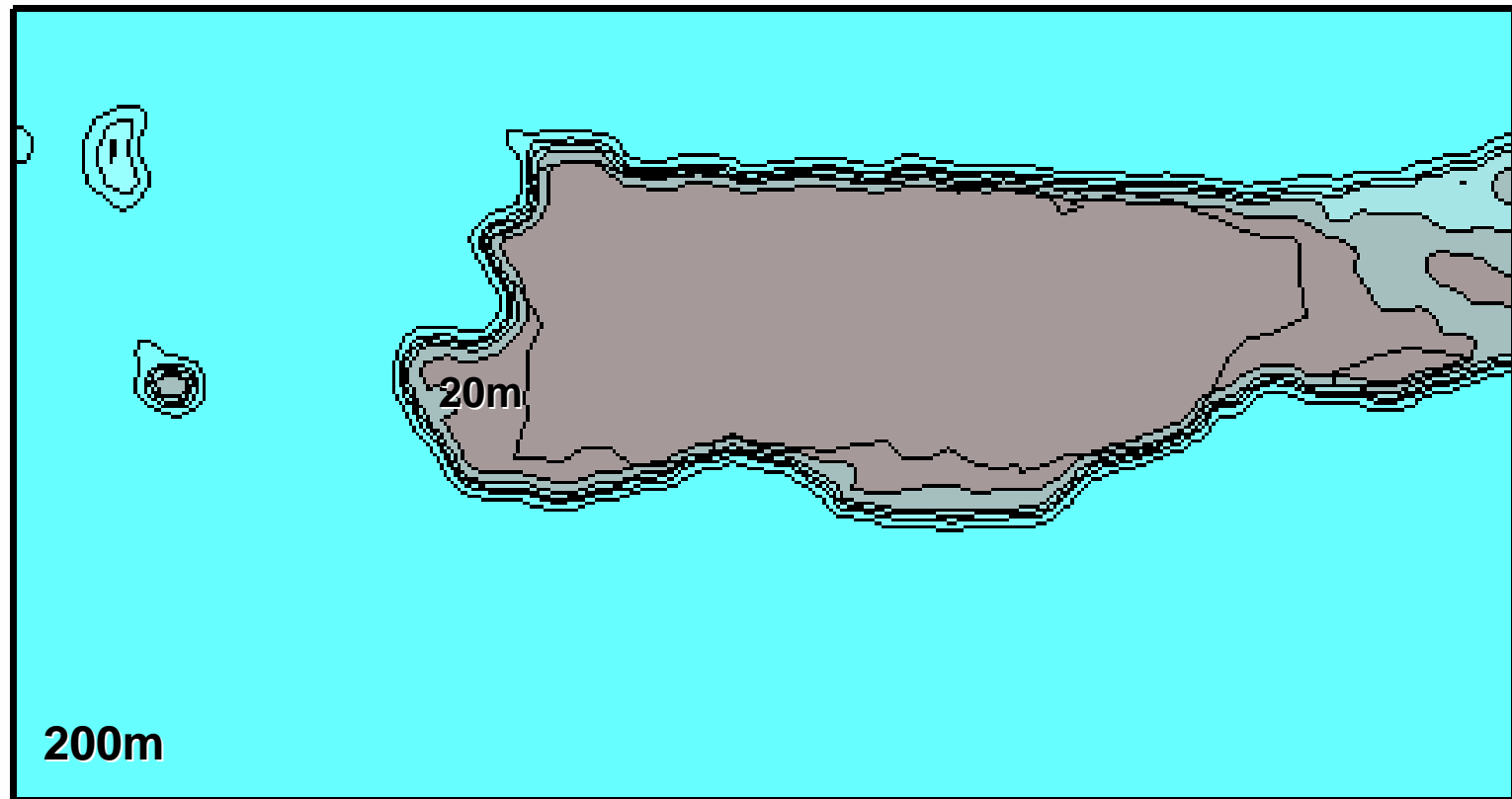


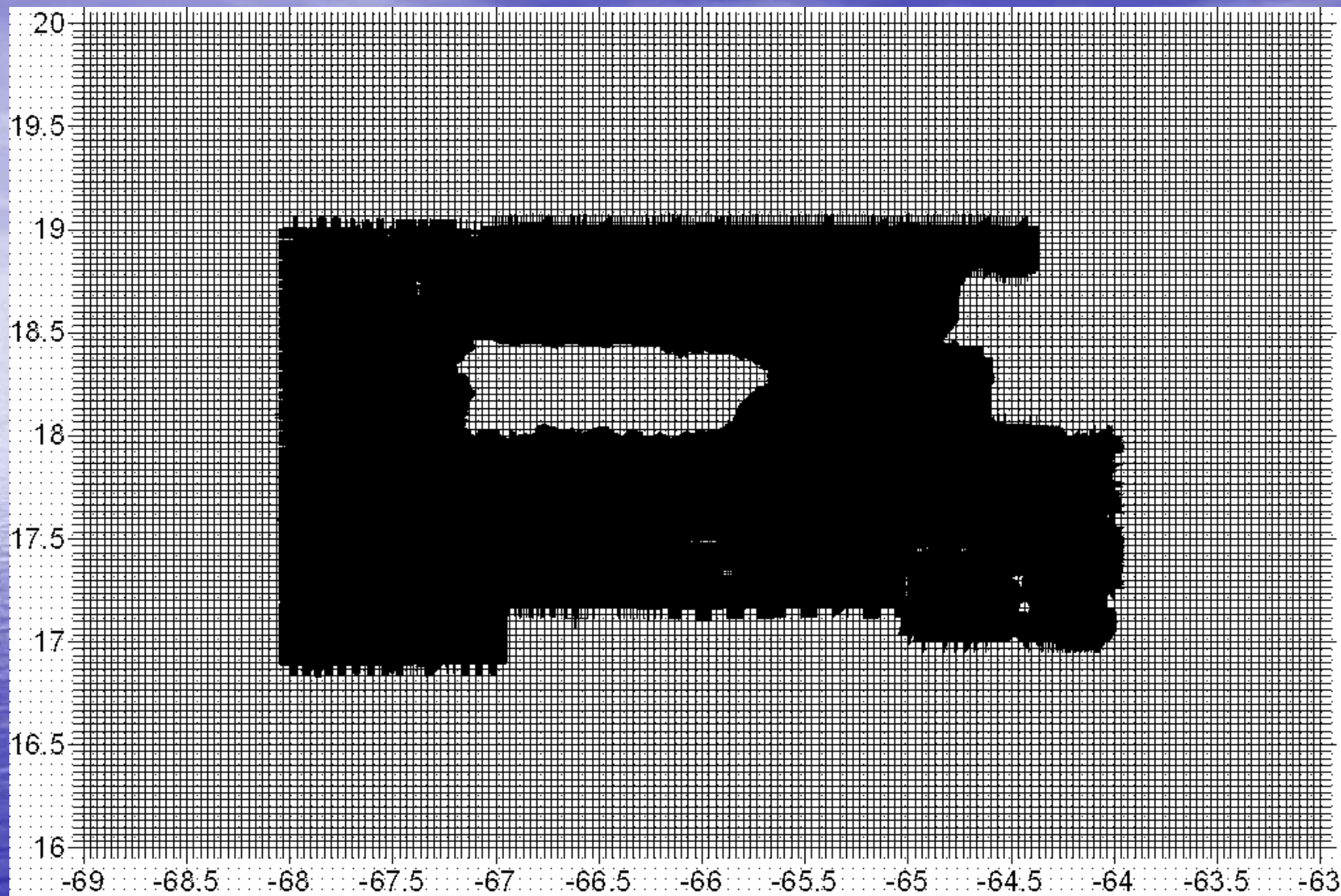
# General Circulation Model: Grid and Mask

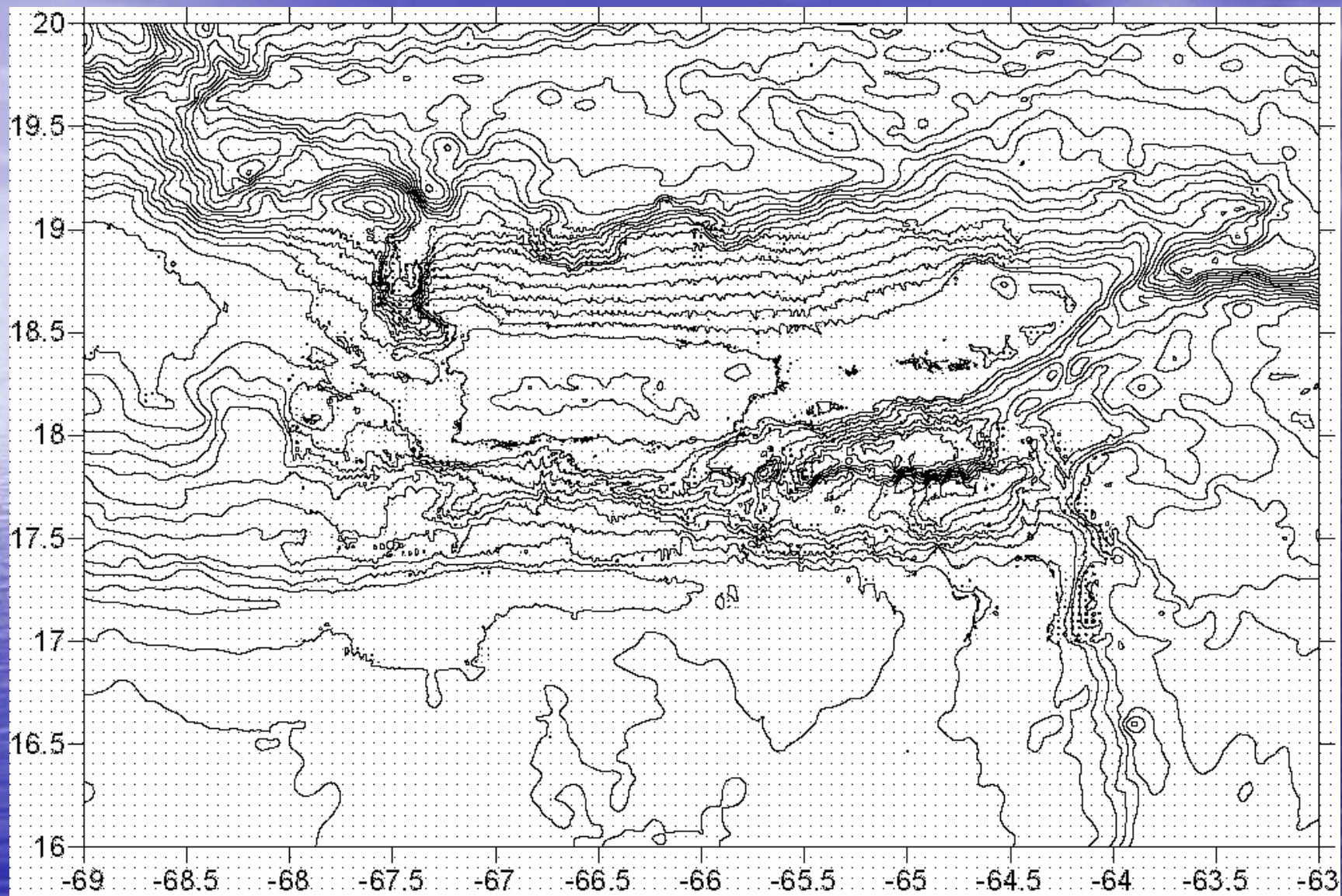




# Domain's Smoothed Bathymetry

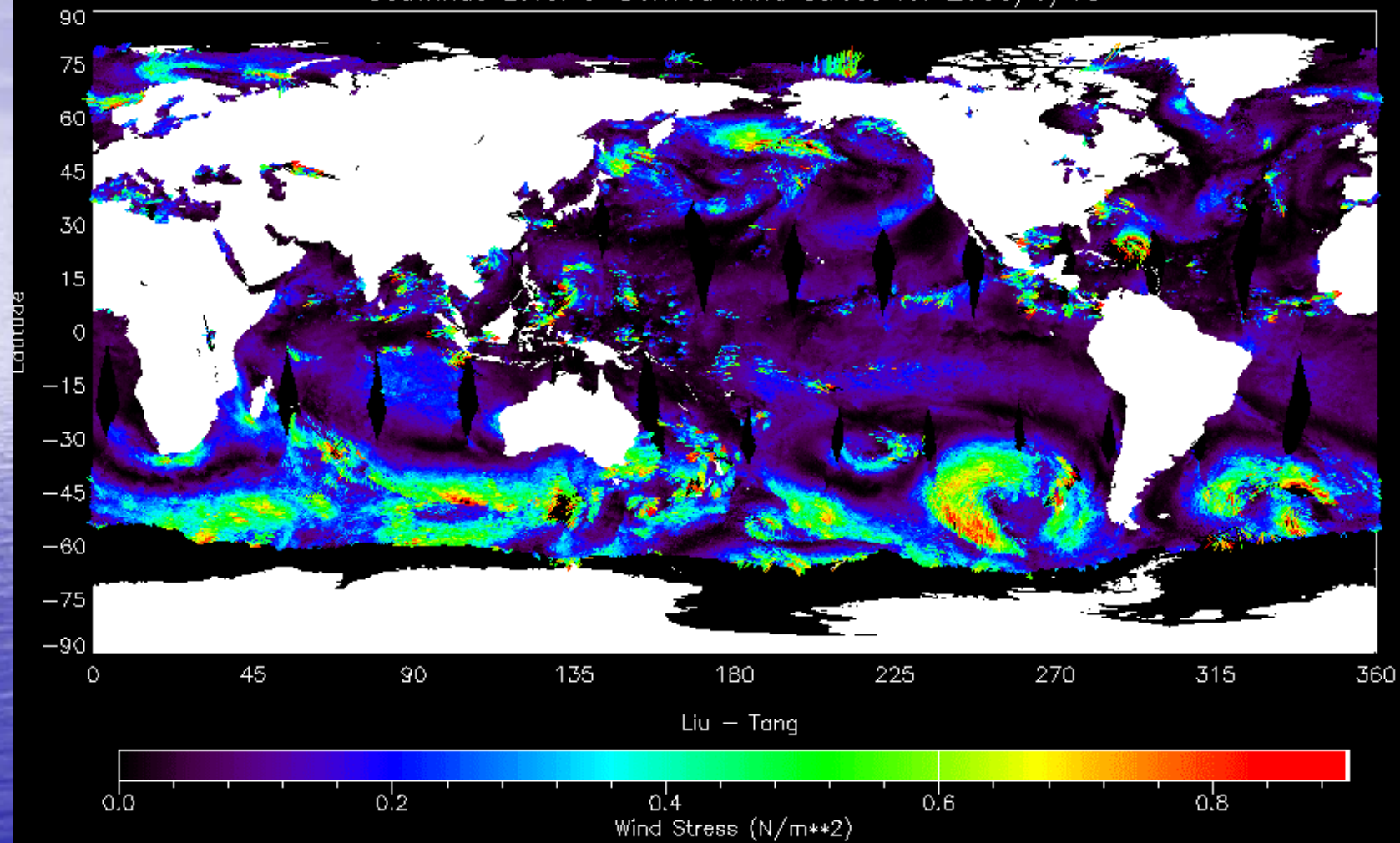


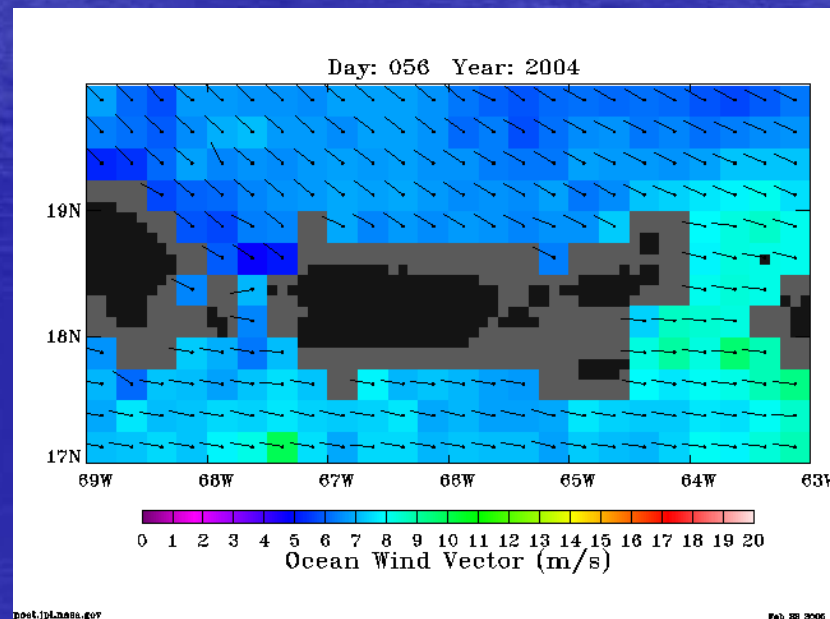
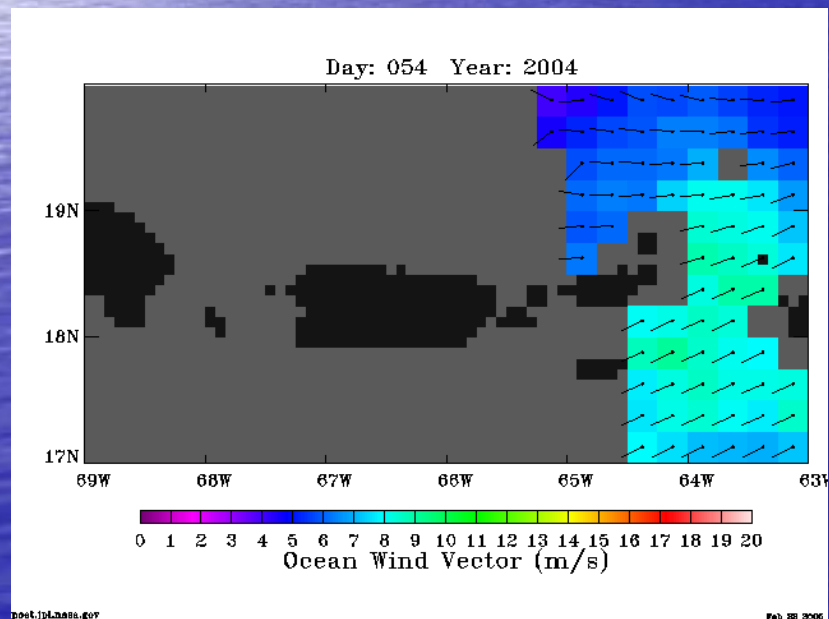
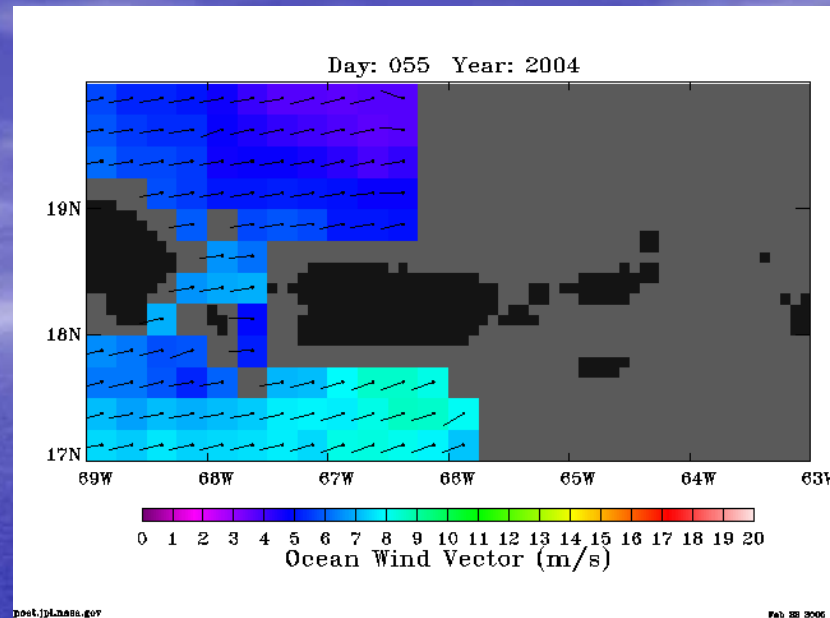
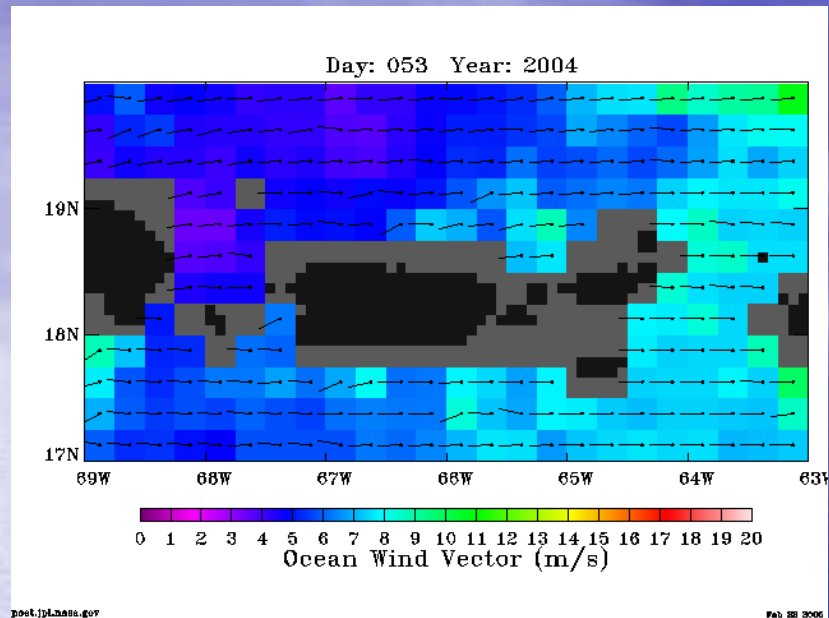




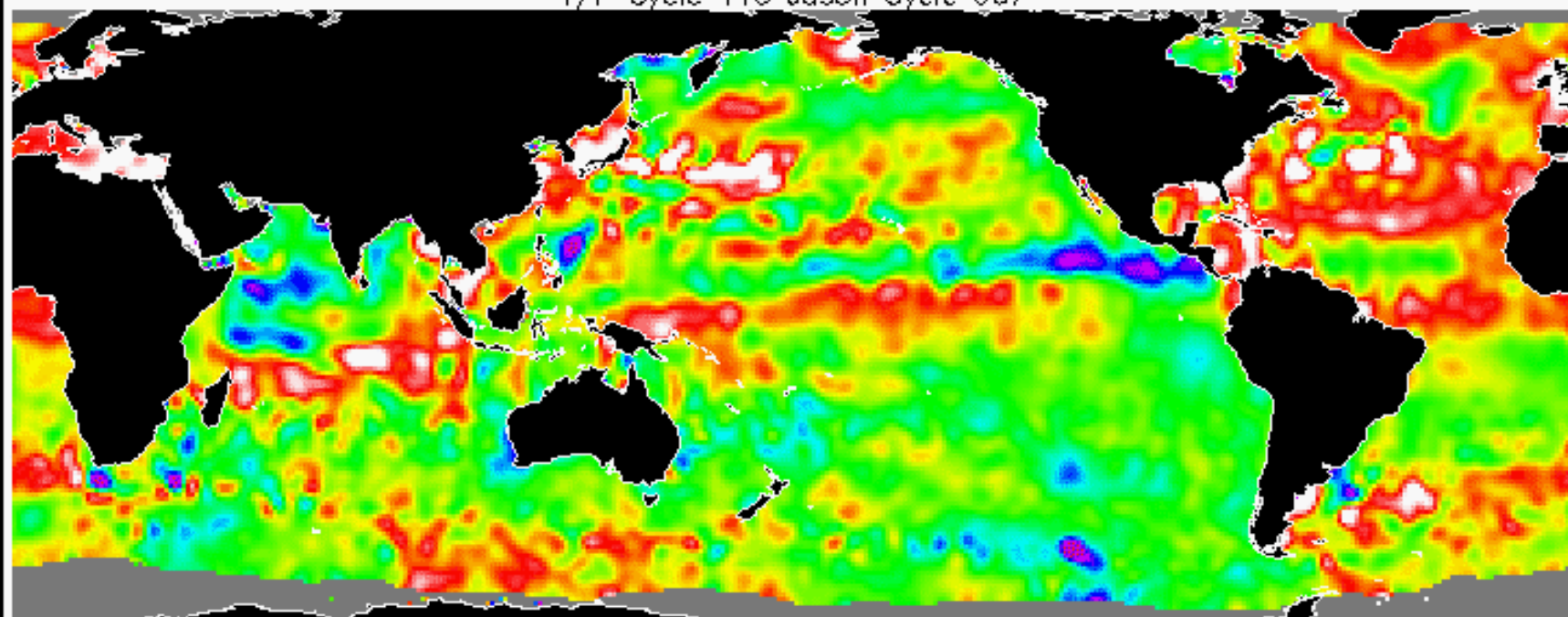


SeaWinds Level 3—Derived Wind Stress for 2003/9/15





Climate Data Record – Ocean Surface Topography  
T/P Cycle 410 Jason Cycle 067



Sea Surface Height above MSS in millimeters

-180 -120 -060 000 060 120 180

**Physical Oceanography**  
Distributed Active Archive Center

Time Range: 15:46:55 2003-10-31 to 13:25:52 2003-11-10 UTC

Generated: Feb 24 2004

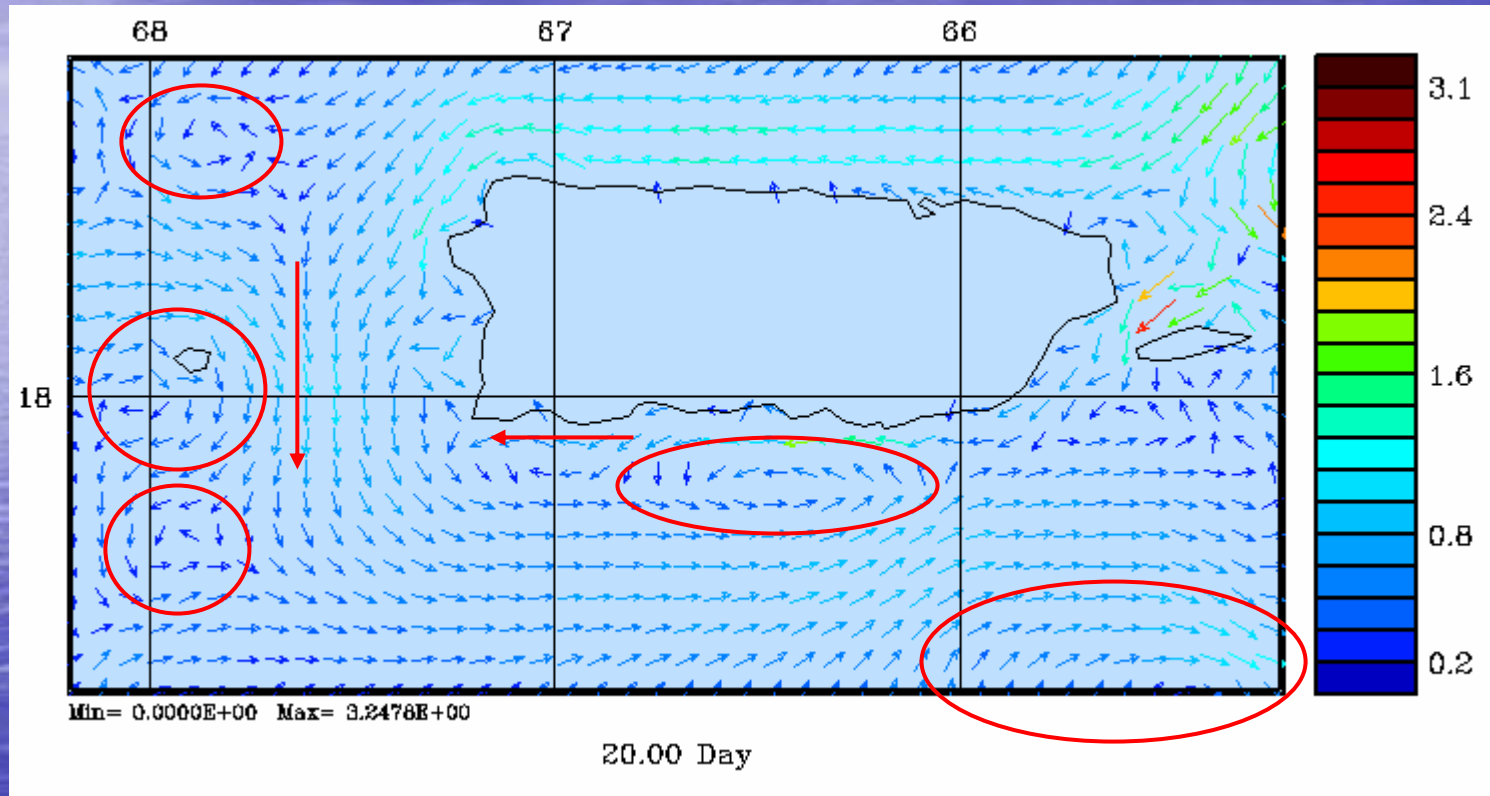
**JPL**



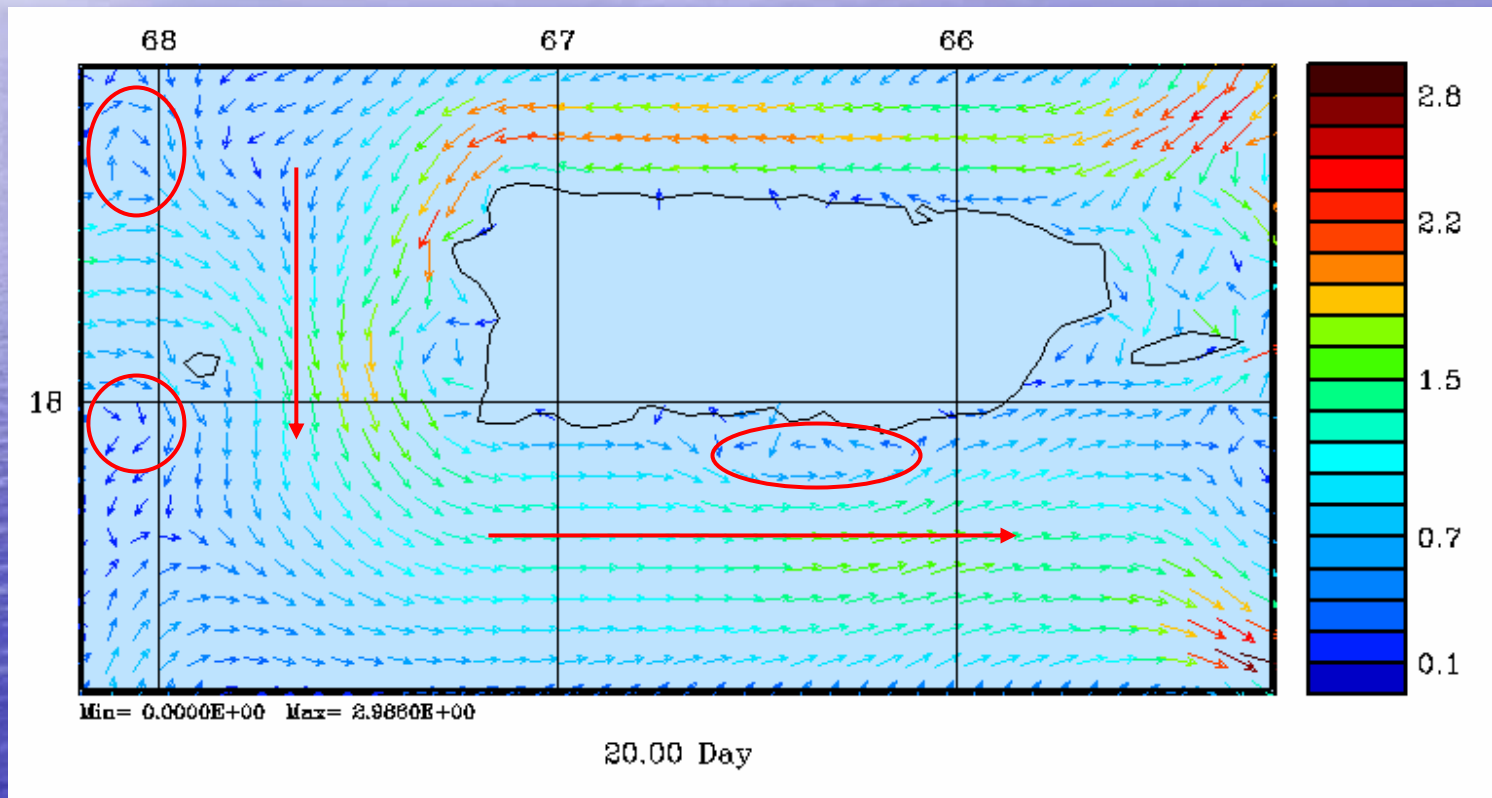
# Tides

- Diurnal
  - 24.8 hours period
  - Maximum magnitude of 0.15 m/s.

# Seasonal pattern for the November – August period



## Seasonal pattern for the September – October period





# Questions and Comments